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## BOVINE TUBERCULOSIS: BIOLOGICAL TESTS OF MILK

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In the *Veterinary Record*, Vol. xi, p. 1072, the writers recorded the results of biological tests of 1,435 samples of milk received from one county in England during the twelve months' period, to June 11th, 1931. Of these samples, 8·2 per cent. were positive, though this figure slightly under-estimates the percentage for the county, as it excludes milks from clinically tuberculous cases previously removed from some of the herds by veterinary officers. Of the positive samples, 55 per cent. were detected primarily within five weeks by clinical examination of the guinea-pigs, the remaining 45 per cent. being detected in the sixth week at the time of routine slaughter. In 23 per cent. of the positive samples one of the pair of guinea-pigs died prematurely without showing evidence of tuberculosis and the great majority of such deaths occurred within 14 days of inoculation. In 10 per cent. of the positive samples one of the pair of guinea-pigs remained macroscopically free of tuberculosis up to the time when the disease was diagnosed in the other guinea-pig.

Since these results were published a further 2,755 samples of milk have been examined in the two-year period ending June 11th, 1933. The same routine methods were adopted as evolved during the examination of those previously recorded. The following table shows the nature of the samples, the number examined in each category and the number and percentage of positives.

**Table I**

NATURE OF SAMPLES AND NUMBER OF POSITIVES

| Nature of Sample. | No. Examined. | Positive. | % Positive. |
|---|---|---|---|
| Special ... ... | 25 | 8 | 32 |
| Control (Group) ... | 355 | 65 | 18·3 |
| Mixed Direct ... | 2,368 | 213 | 8·9 |
| Churn ... ... | 7 | — | — |
| | 2,755 | 286 | 10·3 |

*Special* samples are from suspected individual cows.

*Control (Group)* samples are mixed direct samples from herds in which one or more special samples have been taken separately from suspicious cows or from which a cow with a tuberculous udder has been removed.

*Mixed direct* samples contain some of the milk from each and all of the cows in the herd.

*Churn* samples are taken with a sterile dipper from the churn at the farm.

### TIME TAKEN IN DIAGNOSIS

One of the objections raised against the biological test is that a period of six weeks or more may elapse before a diagnosis can be obtained. While it may be accepted that a period of about six weeks should elapse before giving a negative diagnosis, it is of interest to observe the times taken in reporting the 286 positive samples, and these are recorded in Table II.

**Table II**

TIME TAKEN IN ARRIVING AT A POSITIVE DIAGNOSIS

| | 2nd week 8-14 days. | 3rd week 15-21 days. | 4th week 22-28 days. | 5th week 29-35 days. | 6th week 36-42 days. |
|---|---|---|---|---|---|
| No. of samples ... | 3 | 30 | 85 | 43 | 125 |

The routine procedure followed is to examine clinically all inoculated guinea-pigs from the third week following inoculation, though in a few cases earlier examinations have been made. All inoculated guinea-pigs not clinically diagnosed earlier are destroyed in weekly batches during the sixth week following their inoculation.

An examination of Table II shows that:—

The percentage of positives clinically diagnosed within three weeks = 11·5.

The percentage of positives clinically diagnosed within four weeks = 41·2.

The percentage of positives clinically diagnosed within five weeks = 56·3.

The percentage of positives diagnosed by routine slaughter in the sixth week = 43·7.

### POSITIVE SAMPLES WHERE ONE GUINEA-PIG REMAINED HEALTHY

Amongst the 286 positive samples, in 21 instances one guinea-pig failed to become infected, there being an entire absence of macroscopic lesions on *post-mortem* examination made at the date when the positive diagnosis was arrived at from the other guinea-pig. This gives a percentage of 7·3 of the positives but less than 1·0 per cent. of the 2,755 samples examined. Taken in conjunction with the figures given for the premature death of one of the pair of guinea-pigs, we see the need for the inoculation of more than one guinea-pig per

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sample. How many more positive results might be obtained if three guinea-pigs per sample were used remains a matter for conjecture. The use of three guinea-pigs per sample would add considerably to the cost of the test and it is more than doubtful whether the number of extra positives, if any, would justify the extra expense. The small percentage of samples in which a diagnosis could not be given because of the premature death of both guinea-pigs would not seem to justify the routine use of three guinea-pigs per sample.

The fact that in 7·3 per cent. of our positives one of each pair of guinea-pigs remained unaffected may afford an explanation of some of the recorded cases of so-called intermittent excretion of *M. tuberculosis* in milk, as it shows that, however reliable the biological test is believed to be, an efficiency of 100 per cent. is not to be expected.

### Positive Samples where One Guinea-pig Died Prematurely Without Lesions of Tuberculosis

Amongst the 286 positive samples, in 51 instances one guinea-pig died prematurely without exhibiting any macroscopic lesions of tuberculosis, the positive diagnosis for the sample being arrived at by the appearance of the disease in the other guinea-pig. The percentage of the positive samples in which this occurred works out at 17·8.

The periods within which these premature deaths occurred are here shown:—

Number which died within 14 days = 35
" " " in the third week = 10
" " " in the fourth week = 6

It may reasonably be supposed that the earlier the date at which such deaths occur following inoculation the more likely is it that death was due to organisms, other than *M. tuberculosis*, present along with it in the milk sample. It has not so far been found possible to investigate the precise cause of death in these cases, but in many the lesions have been recorded as those of a septicæmia. It has been assumed that in a proportion of such cases secondary invaders have been present in the milk, along with the tubercle bacterium, though the possibility of extraneous organisms obtaining entrance during the collection of the sample must not be overlooked.

The absence of any macroscopic evidence of tuberculosis in the 16 guinea-pigs which died as late as the third and fourth weeks suggests that but for the presence of other infection these guinea-pigs might have come into the category of those remaining healthy whilst their fellows became tuberculous.

### Number of Samples where Both Guinea-pigs Died Prematurely and a Definite Opinion on the Sample could not be Given

Amongst the 2,755 samples of milk examined, in 105 instances both guinea-pigs died prior to the sixth week. This works out at 3·8 per cent. of the samples.

Of the 105 samples, in 32 instances both the guinea-pigs were dead within two weeks of inoculation.

Although less than 4 per cent. of tests spoiled on account of the premature death of the guinea-pigs may not be a large proportion, it is nevertheless sufficient to cause inconvenience and financial loss and one must consider the possibility of reducing such deaths to the barest minimum. The loss of a sample in this way means not only the loss of the cost of carrying out the actual test but of the cost of collection of the sample as well. In addition, it leaves the local authority carrying out routine biological tests in doubt about the particular herd from which such a sample came. If that doubt is to be removed a special journey must be undertaken for that herd and if a further sample is to be taken in the case of a control or group sample much extra labour is involved.

In carrying out the tests done during the past three years every effort has been made to reduce such losses. Guinea-pigs have been purchased only from sources believed to be reliable. Guinea-pigs arriving in weekly batches have been kept separate from laboratory stocks until their state of health is known, and experience has taught us the wisdom of this procedure. All the stocks of guinea-pigs are gone over daily at feeding time and if ailing animals are found they are at once removed and killed for *post-mortem* examination. Batches which, after observation, are not up to the standard of our requirements in health are returned to the supplier. Guinea-pigs are kept at least a week prior to being used for the tests. Moreover, the guinea-pigs used for the tests are those judged to be the best by selection from our healthy stocks. Weaklings amongst the healthy stocks, even should there be no evidence of actual disease, are killed off. The most rigid care is observed in feeding and cleaning pens and cages, and routine cleansing and disinfection of pens, cages and houses is practised. All this involves extra expense but is, in our opinion, necessary if losses from " intercurrent infection " are to be avoided. By this term is meant the appearance of pneumococcal infection, otherwise termed guinea-pig pneumonia or septicæmia, or guinea-pig paratyphoid recognised by lesions in the wall of the intestines with involvement of the mesenteric lymphatic glands.

The precautions detailed above do not, of course, protect the inoculated guinea-pigs against the effects of contaminating organisms in the inoculum. The death of both guinea-pigs is presumptive evidence that the cause of death was in the inoculum and the nearer the deaths follow on the date of inoculation the stronger

must be this presumption. Early deaths from septicæmia may be attributed to a like cause, though possibly in some cases the inoculum may, in a constitutionally weak animal, light up a latent pneumococcal infection into a pneumococcal septicæmia. Definite investigations into these points have not as yet been made.

Contaminating organisms in the inoculum may be regarded as practically unavoidable unless an almost impracticably elaborate technique were used. The presence of extraneous matter in group samples taken in the cowshed in the early hours of the morning is practically unavoidable and, no matter how careful the sampler may be, cow hairs and pieces of straw may at times be found in samples following centrifugation.

Even if perfection in sampling could be obtained there is always the possibility of organisms other than those of tuberculosis being present in the milk when drawn and that these may cause, directly or indirectly, the death of the inoculated guinea-pigs. Minett and his co-workers, in a cultural examination of 16 herds, some of which were selected as having had udder disease, found that 39 per cent. of the cows were carriers of the streptococcus of mastitis. There are to be considered, in addition, the other causal organisms of mastitis, as well as organisms which gain entrance to the udder following invasion by the tubercle bacterium.

It is not easy to explain why premature deaths occur at times in batches; for example, 12, 10 and 14 samples in three successive months followed by 1 in the next month, or 15, 6, 6 and 1 in successive months, and at first thought one would be apt to conclude that batches of deaths like these were more likely to be attributable to the guinea-pigs than to the direct effect of the inoculum.

Death of both guinea-pigs under three completed weeks without any lesions of tuberculosis must leave a doubt as to whether the sample can be accepted as a negative. Death after three or four completed weeks without lesions implies that the majority can be accepted as negative unless one is to assume that the 40-50 per cent. of positives found on *post-mortem* examination in the sixth week had no lesions present at all up to the end of the fourth week. This assumption would seem to be unjustifiable from experience of the extent of the lesions present in the sixth week.

### The Presence of Blood in the Deposit

Blood was found macroscopically present in the deposit in the centrifuge tube in 86 samples, or 3·1 per cent.

Of this number, 13 samples were positive; or approximately 15 per cent.

The remaining 73 samples were negative, or approximately 85 per cent.

It is felt that the presence or absence of blood in the centrifuge tube deposit cannot be accepted as an indication of a positive or negative sample.

### The Presence of Pus in the Deposit

Pus was found macroscopically present in the centrifuge tube deposit in 245 samples, or 8·8 per cent.

Of this number 38 samples were positive, or approximately 15 per cent.

The remaining 207 samples were negative, or approximately 85 per cent.

The conclusion reached with regard to pus in samples is the same as that for blood.

# THE OCCURRENCE OF ACID-FAST BACTERIA, OTHER THAN *MYCOBACTERIUM TUBERCULOSIS*, IN MILK

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Under the above title Dr. Albiston, in the *Australian Veterinary Journal*, Vol. vi, p. 123, places on record the results of the examination of milk samples from nearly 1,300 dairy farms in Australia. He found that 9·3 per cent. of the samples contained "saprophytic acid-fast bacilli," the diagnosis being made from guinea-pig lesions "due to these acid-fast bacilli." In 26 per cent. of 213 of his samples Albiston detected saprophytic acid-fast organisms by microscopic examination of the centrifuge deposit. Albiston evidently considers that his investigations justify doubts as to the value of the biological test of milk samples for tuberculosis as ordinarily carried out, and in view of his findings it is rather remarkable that they appear to have passed almost unnoticed. His results are the opposite of those recorded previously by Wilson and Nutt in Britain, and to which he refers. These authors were unable to cultivate saprophytic acid-fast organisms from 68 instances of lesions in guinea-pigs in which acid-fast organisms were found following milk sediment inoculation.

In 119 cases Albiston found acid-fast bacteria in guinea-pig lesions, and from 44 of these he isolated saprophytic acid-fast bacteria on ordinary media unsatisfactory for the growth of the tubercle bacterium. His cultures were impure, cocci predominating. In the remaining 75 cases he diagnosed the presence of saprophytic acid-fast bacteria by the microscopic characters of the organisms and the naked-eye appearance of the lesions.

The impression is given by Albiston's article that there was really no very marked difference

between his guinea-pig lesions which he believed to be caused by saprophytic acid-fast bacteria and those accepted as caused by *M. tuberculosis*, and that the saprophytic organisms were not distinguishable with any degree of certainty by the microscope from *M. tuberculosis*.

A weakness in Albiston's arguments seems to be in the absence of published proof, (1) that his guinea-pig lesions were really caused by the saprophytic acid-fasts; (2) that *M. tuberculosis* was not present in the lesions as well; and (3) that the cocci grown from the lesions were not the actual cause of the lesions. One would wish to know what the result would have been if the guinea-pig lesions had been used for the inoculation of other guinea-pigs. It should be emphasised, however, that Albiston found acid-fast bacteria microscopically in 26 per cent. of his centrifuge deposits and that on one farm where he collected individual milk samples with due precautions he found five cows whose centrifuge sediment showed acid-fast bacteria, notwithstanding the absence of udder disease.

The purpose of this note is to place on record that the authors, with Albiston's findings in mind, have not come across anything to indicate that saprophytic acid-fast bacteria are a factor to be taken into account, in this country, in the biological examination of direct milk samples for tuberculosis.

In the course of a very large number of microscopic examinations of centrifuge sediments we have not encountered acid-fast bacteria about whose identity we need have been in any real doubt. We have found that in some instances in the thicker and imperfectly decolourised parts of the film diphtheroid organisms may retain the fuchsin stain, but these organisms have never allowed of any possibility of mistaking them for *M. tuberculosis*. They are, as a rule, short, thick organisms arranged in clumps. Cultural examination of such samples has proved these organisms to belong to the genus *Corynebacterium*.

During the examination of over 4,400 milk samples submitted to the biological test, using two guinea-pigs per sample, we have only on very rare occasions found lesions in the guinea-pigs which left the diagnosis in any way in doubt, and these doubts would not have arisen but for Albiston's findings in Australia in connection with what might be termed restricted lesions. A positive diagnosis has only been given after finding acid-fast organisms with the morphological characters recognised as being those possessed by *M. tuberculosis*. We have never encountered anything in guinea-pigs which would lead us to think that there is more than one type of lesion in which acid-fast bacteria are found; that is to say, all supposedly tuberculous lesions have been beyond doubt tuberculous as judged by well-known criteria and have contained morphologically typical tubercle bacteria.

The authors considered it advisable, in view of Albiston's findings, to go through their records of milk inoculations and find out in how many cases of restricted local guinea-pig lesions, reported after microscopic examination as being positive, tuberculous cows could or could not be traced by the veterinary officer concerned. Table I gives particulars of cases met with during a period of ten months, twelve cases in all out of some 1,300 of our milk samples.

It will be seen from Table I (page 878) that in three cases of restricted lesions in guinea-pigs with acid-fast bacteria present no source of infection could be found in the herd by clinical veterinary examination and no animals had been moved off the premises. This does not mean that the herds could be regarded as tubercle-free, nor does it mean that *M. tuberculosis* was not being excreted in the milk of any of the cows, but it might be claimed that these were instances of infection of the guinea-pigs with non-tuberculous acid-fast organisms. Accordingly, the authors decided that in future instances of restricted guinea-pig lesions showing acid-fast organisms, another healthy guinea-pig would be sub-inoculated with material from such lesions and results awaited. It was felt that this was the best method of determining the nature of the acid-fast organisms and that if the sub-inoculated guinea-pig developed progressive lesions, tuberculous in character, one could no longer regard as saprophytic the acid-fast organisms detected in the first guinea-pigs. It was felt that growth of saprophytic acid-fast organisms, from restricted lesions, upon glycerin-agar did not exclude the possibility of the presence also of *M. tuberculosis* in the lesions.

Up to the present time, only in nine such cases have the authors felt that this procedure might be deemed necessary to support their diagnosis of tuberculosis, and in eight of these cases the lesions in the second guinea-pigs left no room for doubt as to the correctness of the original diagnosis. The circumstances relating to the remaining case are discussed later.

Particulars of the cases are given below. In all these cases, inoculations of guinea-pigs were done subcutaneously on the inside of a thigh. In the case of milk samples the inoculum was the centrifuge sediment of 100 c.c. of milk, mixed with 2·0 c.c. of the milk and divided between two guinea-pigs.

(1) *Sample* 2839 (11 *cows*).

Received on 4/5/32. Inoculated into guinea-pigs Nos. 834 and 888. No. 834 died of pneumonia. No. 888 showed, on 8/6/32, enlargement of the precrural gland suspicious

## Table I

| Sample No. | Date Inoculated. | Guinea-pigs Killed. | Lesions in Guinea-pigs. | Veterinary Officer's Observations. |
|---|---|---|---|---|
| 1482<br>28 cows. | 18/6/31 | 27/7/31 | G.P. 1. Nodule half size of pea in inguinal region, hard and no pus.<br>G.P. 2. No lesions. | No tuberculous udder found, but cow with chronic cough and other symptoms found. Two cows were removed from the herd between the collection of the sample and the veterinary examination. |
| 1493<br>5 cows. | 20/6/31 | 27/7/31 | G.P. 1. Precrural gland pus only.<br>G.P. 2. Precrural gland slightly enlarged. | No source of infection found. No movement of cows off the premises. |
| 2292<br>22 cows. | 31/12/31 | 8/2/32 | G.P. 1. No lesions.<br>G.P. 2. Inguinal gland affected. Sublumbar gland hæmorrhagic. | Tuberculous udder found. |
| 2301<br>19 cows. | 1/1/32 | 21/1/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural gland pus. | No source of infection found. One cow removed from the herd between collection of the sample and the veterinary examination. |
| 2383<br>13 cows. | 19/1/32 | 29/2/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. No lesions. | No source of infection found. No movement of cows off the premises. |
| 2492<br>10 cows. | 11/2/32 | 10/3/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural and inguinal glands pus. | Tuberculous udder found. |
| 2528<br>15 cows. | 18/2/32 | 29/3/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural and inguinal glands pus. | No tuberculous udder found, but cow with chronic cough and other symptoms found. No movement of cows off the premises. |
| 2586<br>17 cows. | 3/3/32 | 11/4/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural gland pus. | No source of infection found. One cow suffering from Johne's disease removed from the farm before the veterinary examination. |
| 2644<br>9 cows. | 16/3/32 | 25/4/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural and sublumbar glands enlarged. | Tuberculous udder found. |
| 2658<br>12 cows. | 17/3/32 | 25/4/32 | G.P. 1. No lesions.<br>G.P. 2. Precrural gland pus. | No source of infection found. No movement of cows off the premises. |
| 2784<br>8 cows. | 21/4/32 | 18/5/32 | G.P. 1. Precrural gland pus.<br>G.P. 2. Precrural gland pus. | Tuberculous udder found. |
| 2785<br>10 cows. | 22/4/32 | | G.P. 1. Died 24/5/32, pneumonia. Precrural gland pus.<br>G.P. 2. Died of pneumonia. No local inoculation lesions. | Tuberculous udder found. |

of tuberculosis, and was destroyed on 13/6/32. Only the precrural gland showed any lesion on *post-mortem* examination. Acid-fast organisms regarded as typical of tuberculosis were found in the pus. The pus, diluted in saline, was used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 13/6/32 with diluted pus from guinea-pig No. 888.

On 15/7/32 the guinea-pig, which had developed clinical lesions, was destroyed. There were present a local ulcer, enlargement of the precrural, inguinal and sublumbar glands, and enlarged spleen with numerous ill-defined nodules, and numerous small nodules in the liver. Macroscopically the lesions were indistinguishable from tuberculous lesions. Acid-fast organisms were found by the microscope in smears made from the ulcer and glands. Cultures from the gland on Dorset's medium yielded, after prolonged incubation, a growth of beaded acid-fast organisms indistinguishable from *M. tuberculosis.* Sections of liver tissue showed areas of necrosis with extensive endothelioid cell proliferation. A few acid-fast organisms were found. Sections of spleen tissue showed more advanced areas of necrosis and endothelioid cell proliferation than were present in the liver. Numerous acid-fast organisms were found. Giant cells were not found in either the liver or spleen. It was concluded from a consideration of all the findings that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

The herd was examined by the veterinary officer on 16/6/32. The milk of the only suspected cow was examined microscopically and found negative. A herd sample was again submitted to the biological test and reported as positive five weeks after inoculation of the guinea-pigs. Re-examination of the herd revealed a cow with a tuberculous udder, the milk being positive microscopically.

(2) *Sample* 2843 (15 *cows*).

Received on 5/5/32. Inoculated into guinea-pigs Nos. 873 and 822. Both guinea-pigs had shown clinically a small local abscess on the leg at the inoculation site. *Post-mortem* examination on 13/6/32 revealed in No. 822 no other lesion than the local abscess. In No. 873 there was, in addition, a lesion in the inguinal gland. Acid-fast organisms regarded as typical of tuberculosis were found in the lesions. Material from the inguinal gland of No. 873 was suitably prepared and used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 13/6/32. Extensive local ulceration developed, with a very large lesion of the precrural gland. The inguinal and sublumbar glands were also affected. The spleen became enlarged with the presence of numerous nodules and numerous nodules were present in the liver. Cultures from the glands were made on Dorset's egg medium and a growth of *M. tuberculosis* resulted. Acid-fast organisms were found in sections of the spleen, but none were seen in liver sections. In the liver and spleen there were areas of necrosis surrounded by proliferations of endothelioid cells, the spleen lesions being more advanced.

The conclusion was reached that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

Three small herds had contributed to Sample 2843. No case of tuberculous mastitis was found, but a cow was sold to the butcher from one herd between the collection of the sample and the clinical examination.

(3) *Sample* 2883 (15 *cows*).

Received on 19/5/32. Inoculated into guinea-pigs Nos. 987 and 929. No. 929 did not display any lesions clinically or *post-mortem.* No. 987 developed a local abscess and the precrural gland became enlarged. On *post-mortem* examination on 27/6/32 the inguinal gland was found to be slightly involved. Acid-fast organisms were found in the lesions. Material from the inguinal gland was suitably prepared and used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 27/6/32 and destroyed on 8/8/32. There was a large cutaneous ulcer, and tuberculous lesions in the precrural, inguinal and sublumbar glands. The liver and spleen showed advanced tuberculous lesions and tuberculous nodules were present also in the lungs. Acid-fast organisms were found in the lesions. Cultures from the liver gave a pure growth of *M. tuberculosis.* Liver sections showed proliferation of the interlobular tissue with numerous endothelioid cells. Necrosis was present in the new tissue and in the liver lobules. Neither giant-cells nor caseation was present. Large numbers of acid-fast organisms were seen. Spleen sections showed hardly any normal tissue left in the involved areas, extensive formation of new tissue, extensive necrosis, no giant-cells, no caseation, and large numbers of acid-fast organisms. Lung sections showed tuberculous areas of varying sizes with new tissue formation, some

of the nodules showing necrotic centres, no giant-cells, and very numerous acid-fast organisms.

The conclusion was reached that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

A cow with tuberculous mastitis was found by the veterinary officer at his next visit. The milk from this cow showed tubercle bacteria microscopically.

(4) *Sample* 2957 (25 *cows*).

Received on 8/6/32. Inoculated into guinea-pigs Nos. 55 and 70. Both guinea-pigs were killed on 18/7/32. No. 55 showed only a local abscess, but with numerous acid-fast organisms in the pus. No. 70 showed only an enlarged precrural gland, in whose pus acid-fast organisms were present in small numbers. Material from the precrural gland was suitably prepared and used upon a healthy guinea-pig subcutaneously.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 18/7/32, and destroyed on 1/9/32. There was present a large local abscess, together with tuberculous lesions in both precrural glands, the inguinal, sublumbar and one axillary gland. The liver and spleen showed tuberculous lesions and there were nodules in the lungs. The liver in sections showed localised areas of endothelioid cell proliferation with no necrosis caseation or giant-cells. No acid-fast organisms were seen. Spleen sections showed large areas of endothelioid cell proliferation without necrosis or caseation. Giant-cells were present. Acid-fast organisms were found, but were scarce. Lung sections showed areas of consolidation due to endothelioid cell proliferation without necrosis, caseation or presence of acid-fast organisms.

The conclusion was that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

It was not until his fourth visit that the veterinary officer was able to find a cow with a tuberculous udder, and he was then able also to find tubercle bacteria in the milk of the cow microscopically. The case was one which presented extreme difficulty in clinical detection.

(5) *Sample* 3115 (10 *cows*).

Received 16/7/32. Inoculated into guinea-pigs Nos. 375 and 399. No. 399 died prematurely. No. 375 was destroyed on 22/8/32 and showed a lesion only in the precrural gland. Pus from this gland contained numerous acid-fast organisms and was used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 22/8/32 and destroyed on 3/10/32. Tuberculous lesions were present in both precrural glands, one sublumbar and one inguinal. The spleen, liver and lungs also showed lesions. Spleen, liver and lung sections showed localised areas of endothelioid cell proliferation and in the spleen there were areas of necrosis. Acid-fast bacteria were present in all the tissue sections, but no giant-cells were seen. The conclusion was that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

Two small herds had contributed to Sample 3115. No case of tuberculous mastitis was found by veterinary examination, and separate group samples were received from the two herds for the biological test. One herd sample was reported as positive and veterinary officers again visited this herd. It was then discovered that a cow had been sold at a fair a few days previously and from information received it appeared highly probable that she had a tuberculous udder.

(6) *Sample* 3123 (*Special Sample from* 1 *Cow*).

The history of this sample is of special interest, and it is being recorded in a separate article (to follow) as an example of the excretion of *M. tuberculosis* in the milk of a cow with an apparently normal udder. This sample was inoculated on 27/7/32 into guinea-pigs Nos. 401 and 406. These were killed on 5/9/32. No. 401 showed tuberculous lesions in the popliteal, inguinal and sublumbar glands. No. 406 showed a local abscess, and the inguinal and sublumbar glands were enlarged. Acid-fast organisms were found in the lesions. Material from the lesions was inoculated into a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 5/9/32 and destroyed on 17/10/32. There were extensive tuberculous lesions locally and in the precrural inguinal and sublumbar glands. The liver and spleen were also affected. Acid-fast bacteria were found in films from the local pus. Spleen and liver sections showed areas of endothelioid cell proliferation and necrosis. Acid-fast organisms were present, along with other organisms, in the sections of both organs. No giant-cells were seen. The conclusion was that the subinoculated guinea-pig was infected with tuberculosis.

The cow from which this sample was taken was slaughtered and found to be extensively tuberculous. (See separate article referred to.)

(7) *Sample* 3161 (26 *cows*).

Received 12/8/32. Inoculated into guinea-pigs Nos. 423 and 436. No. 423 died of an intercurrent infection. No. 436 showed tuberculous lesions on 19/9/32 only in the precrural gland. Material from this gland showed acid-fast organisms and was used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 19/9/32 and destroyed on 1/11/32. Tuberculous lesions had developed in the precrural, inguinal and sublumbar glands, and in the liver and spleen. Acid-fast bacteria were present in the gland pus and in sections from the liver and spleen. Liver and spleen sections showed areas of endothelioid cell proliferation, and the spleen sections showed areas of necrosis. Giant-cells were not seen. The conclusion was that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

Sample 3161 came from the remaining cows in a herd after the clinical detection of a cow with tuberculous mastitis. At the time of collection of the sample no other case was clinically detectable, but on receiving a positive report on the sample, a veterinary officer visited the herd again and found another cow with clinical tuberculous mastitis.

(8) *Sample* 3704 (19 *cows*).

Received 26/1/33. Inoculated subcutaneously into guinea-pigs Nos. 674 and 679. Both guinea-pigs were killed on 6/3/33. No. 674 showed only a small spot resembling a tuberculous lesion in the inguinal gland and an enlarged sublumbar gland. No. 679 showed only enlarged inguinal and sublumbar glands. Acid-fast organisms were found in the lesions only of No. 674 and the sample was reported as positive. Material from the glands of No. 674 was used to inoculate a healthy guinea-pig.

*Subinoculated Guinea-pig.*

This guinea-pig was inoculated on 6/3/33 and was killed on 18/4/33. Tuberculous lesions were present in the precrural glands, but the inguinal and sublumbar glands were almost normal in appearance. The liver and spleen showed extensive tuberculous lesions. Acid-fast organisms were found in sections of liver, spleen and precrural glands, and sections of these tissues also showed areas of endothelioid cell proliferation. The spleen sections showed numerous hæmorrhages. The conclusion was that the subinoculated guinea-pig was infected with tuberculosis.

*Clinical Examination of the Herd.*

Sample 3704 was from the remaining cows in a herd from which a cow with tuberculous mastitis was removed by the veterinary officer. On receiving a positive report upon this sample no further case of tuberculous mastitis was found, but changes in the herd probably accounted for this.

(9) *Sample* 3848 (36 *cows*).

This sample is of interest as being the only instance with which the writers have met of what appeared to be saprophytic acid-fast organisms in guinea-pig lesions. The circumstances, which are somewhat inconclusive, are as follows:—

The sample was inoculated on 3/3/33 into guinea-pigs Nos. 968 and 976. No. 976 died one week later from guinea-pig paratyphoid, and *post-mortem* examination revealed a small quantity of pus at the skin site of inoculation containing acid-fast organisms. The organisms could, in parts of the film, be taken for *M. tuberculosis*. The laboratory report at this date was a qualified positive diagnosis.

No. 968 died of intercurrent infection 15 days after inoculation and pus was found locally at the site of inoculation, with slight enlargement of the precrural gland. Streptococci and other non-acid-fast organisms were numerous in the pus. A second report still further qualified the previous report. Pus from No. 968 was inoculated into a healthy guinea-pig on 21/3/33 and in nine days this guinea-pig died. The only lesions were very extensive subcutaneous suppuration and peritonitis. In the pus, acid-fast organisms were found, some of which were indistinguishable microscopically from *M. tuberculosis*. Cocci and other organisms were also present in the pus.

Meantime, from the report on the findings in No. 976, the veterinary officer had been dealing with the herd. No clinical case of tuberculous mastitis was found, but a sample was collected from a cow with an "unusual udder." In this sample the veterinary officer found acid-fast organisms, regarded by him as not really mistakable for *M. tuberculosis*. A stained film was supplied to the writers and they agreed that the general appearance of the film was not that found in films of tuberculous milk sediment. A special sample of this milk (Sample 3915) was sent to the writers and inoculated into two guinea-pigs, neither of which developed lesions in any way resembling tuberculosis. Pus was present in the centrifuge sediment of this sample. This sample was not examined microscopically by the writers for acid-fast organisms, but a further sample was collected from this cow a fortnight afterwards, and in this they were unable to find any acid-fast organisms. In addition, two group samples from the re-

maining cows in the herd were collected (Samples 3916 and 3917). One of these (No. 3916), on inoculation into two guinea-pigs (Nos. 24 and 41), gave only enlarged precrural glands and a small quantity of pus at the inoculation site of No. 24, in which no acid-fast organisms could be found. The other group sample (No. 3917) gave no result when inoculated into two guinea-pigs (Nos. 6 and 92).

The writers do not regard this case (No. 3848) as in any way parallel to those recorded by Albiston. It appears to have been a chance temporary occurrence of some saprophytic acid-fast organism in milk accompanying a mild udder infection with other organisms. They regarded the guinea-pig lesions as due to pyogenic cocci and not to the concomitant acid-fast organism. They regard it as unfortunate that it was not possible to find the organism again in the later sample of milk received from this cow, as it would perhaps have been possible to isolate it for further study.

At the present time the writers have dealt with 4,400 samples of milk from one county in Britain, but no further instances of purely localised lesions in guinea-pigs with acid-fast organisms have been found, since those recorded above.

As a result of this work, as well as from an examination of many milk samples from other parts of Britain, the writers have been forced to the conclusion that nothing occurs in Britain parallel to the findings of Albiston in Australia.


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# TUBERCULOSIS IN BOVINES*

W. TWEED, M.R.C.V.S., D.V.S.M.
Chief Veterinary Officer, Sheffield

In this short paper, I propose to deal with tuberculosis in bovines and its eradication, advocating that more use than at present be made of the double intradermal tuberculin test.

In my opinion, we have a more reliable method of diagnosis in this test than was ever thought possible prior to its introduction and, briefly, I may indicate its uses as follows.

In non-breeding herds where newly-calved cows are purchased, which are common in large milk-consuming areas, the animals entering many of these herds should pass the tuberculin test. I may give, as an example, a herd under my control, where a cow was dealt with under the Tuberculosis Order and another was condemned on slaughter during the year 1931, when the cows entering the herd were purchased in the open market untested. Since 1932 only cows which passed the tuberculin test were purchased, and in no case has the disease been found in these animals on slaughter, after their milking period in the herd, with the exception of some slight evidence in some mediastinal glands necessitating condemnation of a few pairs of lungs. I maintain that the cost of testing in this herd has been compensated for and they had the additional safeguard against tubercle infection in the milk supply.

An arrangement was made with a dealer to allow his purchases to be tested on his premises, and the cows purchased from him were selected from those which passed the test.

Farmers who purchase cows, which have passed the test, from infected herds, and carry on breeding with them, have met with many disappointments in the attainment of a tubercle-free herd. As an example, I will cite one herd where the owner's heifers, reared on the premises, nearly all reacted to the test through allowing contact with his cows, although the latter were tested on purchase. Young stock should be tested and isolated—on most farm premises it is possible to arrange for calves to be housed and fed separately—and they should be pastured with some shelter, winter and summer, until they are ready to enter the dairy herd. In one instance 15 heifer calves were taken from infected mothers, fed separately and isolated at pasture, and 14 remained free from the disease.

The cows in the dairy herd can be removed and replaced by heifers, making the best arrangements possible for isolation until the milch herd becomes free and self-supporting. Many farmers only want a lead from the veterinary profession, and I have found that more

* Presented to the North Midland Division, N.V.M.A., at Sheffield, June 20th, 1933.

progress can be made by commencing testing young stock than by advocating immediate removal of milch cows which react to the test.

In a herd of my experience no difficulty is experienced in keeping the whole herd free from disease, because the animals remain practically out of doors winter and summer.

I have found that, providing young stock receive good food, they will winter out almost anywhere. This open-air treatment for milk production may be almost impossible on some farms, as the sand and chalk soils are the most suitable, but it could be substituted by well-ventilated sheds. Every opportunity should be taken to provide the animals with their freedom in the open air as far as possible. One useful precaution taken at the birth of the calves is to rub their horns with caustic potash stick and prevent horn growth. This will be of inestimable value throughout their life for facilitating feeding and folding them together and the practice should be more generally advocated. Some farmers like their heifer calves with horns and express the fear that they will slip their chains later in cowsheds, but that has not been my experience.

The development of a herd of polled animals marked with tattoo numbers in the ears, and individual history test sheets, for each animal, can become the ordinary routine procedure for the intelligent farmer to carry out, and once having got the pride of possession of tubercle-free stock in his bones, he becomes an enthusiast for the cause and will not be tempted to put a horned stranger into the herd, other than stock bulls purchased.

Coming to the application of the double intradermal test itself, I appreciate the difficulties met with. That doubtful reactions occur there is no question, and by doubtful reactions are meant those swellings which are other than the non-reaction with the well-defined pea-sized swelling with no œdema, or the positive reaction where the pea-sized swelling has been lost by the presence of œdema. In the case of some very thick-skinned animals it is often difficult to make up one's mind whether a swelling is negative or doubtful. In other cases the swelling produced is large but very hard, with no œdema. These cases should not get the benefit of the doubt and be classed as non-reactors. If test history sheets are available they help enormously, but in any case these animals should be retested later, using a broth control, and, if desired, the subcutaneous test may be used as well. It has been my experience to meet such animals which, in previous tests, were negative, and find in the following test that they gave non-reactions. In other cases, on the retest, they showed œdema, and the disease was confirmed on *post-mortem*. A puzzling doubtful case is one such as the following, but no biological examination of glandular tissue was made and, therefore, it is non-conclusive of no tuberculosis being present in the carcass.

Heifer, Two Years Old, Tested by Double Intradermal Test, August, 1932

| *At injection.* | *48th hr.* | *Character of swelling.* | *72nd hr.* | *Character of swelling.* | *Result.* |
|---|---|---|---|---|---|
| 8 | 10 | No œdema | 12 | No œdema | Negative |
| ***October*, 1932, *by same test*:—** | | | | | |
| 9 | 12 | Circ. Hard No œdema | 15 | Circ. Hard No œdema | Doubtful |
| ***March*, 1933, *same test and broth control*:—** | | | | | |
| 8 | 10 | œdema present | 14 | œdema present | Positive |
| ***Broth control*:—** | | | | | |
| 8 | 10 | No œdema | 10 | No œdema | |
| ***April*, 1933, *subcutaneous test applied*:—** | | | | | |
| | 12th hr. | 15th hr. | 18th hr. | 21st hr. | |
| 102°F. | 101.6°F. | 101.2°F. | 101.6°F. | 102°F. | Negative |

The heifer was slaughtered. No tuberculous lesions could be demonstrated macroscopically; nevertheless, this is preferable to tuberculosis found on *post-mortem* following a non-reaction, and although doubtful cases sometimes occur, they fortunately only do so in a very small percentage of tests.

In regard to measurements, it is obligatory to have these in testing licensed herds, etc., but in general testing the test history sheet of an animal, in my opinion, need only show negative or positive in these cases and the measurements only if the animal is doubtful, for subsequent use in retesting. This saves much time during testing with record-keeping when the results of the tests are obvious; that is, presuming the veterinary surgeon applying the tests knows his job, and there will be no question of the benefit of the doubt being given where it will create danger of infection in the herd.

The results of a test carried out on 36 animals using the standard and the new tuberculins issued from Professor Buxton's laboratory in Cambridge, show that the new tuberculin makes the non-reactions more definite than does the standard tuberculin, and we have since been using the new tuberculin for general testing.

Coming to the problem of the elimination of cows affected with this disease in the udder, in an area such as this there is a continuous entry into the herds of purchased, newly-calved cows. These are affected with the disease in varying stages and, because of this, no reduction in the incidence of the udder type of disease is shown from year to year. It has often occurred to me that, in addition to the purchase of infected cows, there might possibly be a vicious cycle connected with udder infection. We know that most cows with udder infection show old-standing infection of the mesenteric glands. In many cases the extent of the disease in the

lungs does not indicate infection of these glands from the swallowing of infected sputum; on the other hand, many cases of mesenteric infection must occur early in life, as it is revealed by our abattoir statistics that calves slaughtered for veal show these glands to be a common site of infection. It would, therefore, appear that the udder infection in the cow is followed by infection of the calf in the mesenteric glands, this infection in the calf being later in life connected with the development of the udder infection, and so repeating the process in the cycle.

If this is so, then, by tuberculin testing young stock and feeding reactors off for the butcher, another weapon to aid in lowering the incidence of udder infection might be of practical value. In areas such as this we are dependent on the supply of healthy stock from breeding areas. At present we are purchasing infected stock, and are unable to supply them with sanatorium treatment in the form of fresh air, and to eliminate the udder infections and advanced lung infections. When there is an increased supply of tubercle-free cows we can encourage the demand for them and the profession will find that by so doing they are helping to reduce the unnecessary waste which is now taking place from this disease and which is a sad reflection on veterinary preventive medicine.

### Discussion

Mr. W. Collinson opened the discussion. He said he had a fair amount of experience of the use of the double intradermal tuberculin test and he thought it was quite safe to give an opinion in 99 per cent. of cases. The dairy farmer was, unfortunately, obliged to purchase fresh animals to keep up his milk supply in a licensed tuberculin tested herd. He had a herd where 17 animals went down in the next six months after they had passed the test, and it made one think whether the practitioner who tested those animals used sufficient care. They were allowed an increase to 10 mm. in testing licensed herds, but one had to judge the character of the swelling. A non-reaction might be obtained with a greater increase in measurement than that, but he wondered if it was wise to pass them. He would like to know whether different tuberculins gave different swellings in the same animal. He knew of one herd which had been licensed and given up, as the owner could not rear enough animals to be self-supporting, and that was the only way to get a tubercle-free herd. With the small farmer the buildings were not conducive to thorough cleansing and disinfection. It would be a good thing to test, but landlords could not improve the buildings and the farmers would not do it. The farmers tested their cows before calving and sold the reactors in the open market, and the only way testing could be made a success would be to compensate and slaughter reactors and take them off the market altogether.

Mr. Walker said he once had an experience of testing 20 cows with the subcutaneous test, and they all passed; the following year they were again tested subcutaneously with a different tuberculin, and all reacted. He once had a personal letter from Calmette pointing out that animals might be in that stage before the manifestation of allergy after they were infected, when they would not give a reaction to tuberculin. The maximum period after infection when that would happen was not specified. His experience, after reading the results of the double intradermal testing, was that any animal showing other than the pea-sized swelling with no œdema was a reactor. There was no necessity for any latitude being given when using measurements, as the reaction was judged on the œdema present in the swelling and the size of the swelling. Mr. Tweed's theory of the vicious cycle of infection in tuberculosis deserved more study, as there might be a great deal in it. In his experience, also, one area suffered from the diseased animals produced in another area—most of their cows coming from Derbyshire, where there was no routine inspection of cattle. Routine inspection might have its failings, but recently he had only missed three cows in a total of 2,000 when checked by biological examination, and these were all in the early stages of the disease.

Mr. G. Tullis remarked that they needed to know more about the spread of the disease in the animal. The generally-accepted theory was that the bacilli spread by the lymph stream to the udder. In that case, why was not the supramammary lymph gland more often affected? He thought that it spread to the udder more often by the blood stream, and although bacteriologists had yet to cultivate the bacilli from the blood in chronic cases, it might be due to lack of technique. In tuberculosis of the udder without evidence in the rest of the animal, one usually found the supramammary gland affected. Here the infection had gone up the teat, and it was difficult to know why the supramammary lymphatic gland was not more often affected when the disease was elsewhere in the carcass.

Mr. W. Scott said that Mr. Tweed did not recommend using broth as a control. He used this control and simply compared the two folds of skin. In measuring, he picked up the swelling and measured behind it. With different thicknesses in cows' skins testing was purely a relative matter as regarded measurements. Mr. Tweed's method of rearing calves was really Bang's method. Mr. Walker had mentioned the stage after infection before a reaction was given: he knew of a cow bought into a free herd which was two years before she reacted; that showed the benefit of starting with the calves. Up to the time of housing, a large number of cattle passed the test, so that the main infection appeared to be respiratory. With regard to the œdema of the udder being indicative of a tuberculous infection, in first and second calvers it was a normal phenomenon, but after that it could be looked on with suspicion. He had seen enlargement of the supramammary gland and taken samples of milk, with negative results, but this might later be a tuberculous udder. The spread of the disease in the horse appeared chiefly to be *via* the lymph stream, often every gland being found affected.

Mr. D. D. Canning thought that not so much infection took place in early life, the greater part occurring when the animals became milk producers. With regard to the absence of infection of the supramammary gland where the udder was infected, he had heard this explained in that there was so much lymph passing through the gland in the functioning udder that there was no opportunity for the disease to develop, whereas in the dry cow caseation and calcification took place.

Mr. Walker could not accept Mr. Canning's

explanation as to the reason why the supramammary gland became affected less often in the lactating cow, if he meant that this was entirely mechanical. His opinion was that it was a matter of predilection of the tubercle bacillus; *i.e.*, that the bacilli found the environment of the udder proper more suitable for their growth than the lymphatic gland in the lactating cow, and that the phagocytic action of the lymphocytes in the lymph gland of the lactating cow was greater than in the dry cow.

Mr. T. C. Fletcher said that, with the amount of infection there was in cows, it looked as if the disease would be here when we were gone. He thought they had a difficult task to get the farmers in that area to buy tested cows, although they did lose money from the disease. They made the mistake of buying old cows to get the quantity of milk, and those should not be available for them to buy. He had often wanted Mr. Tweed to explain why carcasses should be condemned when the cows had infection of the kidneys, as it had never been proved that that was a blood stream infection. The intradermal test was not in a satisfactory condition. Did Mr. Tweed consider that one injection would be sufficient?

### The Reply

Mr. Tweed, in reply, said that he thought tuberculin testing interesting, and he was agreeably surprised with the discussion and thought it might do good. He had only checked Professor Buxton's new tuberculin against the standard tuberculin in the same animal at the same time and he liked the new tuberculin better, as the non-reactions were more definite, and it was quite reliable tuberculin. It was also much easier to fill into the syringe and use. The two injections were necessary and there would be more doubtful tests if the second were omitted.

The conditions under which young cattle were housed were a disgrace and they would be much better left in the open if old enough to stand the winter. Good feeding helped very much in this direction, and the provision of some shelter for them to use if they wished. He thought there must be more blood stream spread of the tubercle bacilli than was commonly believed.

He judged carcasses on the recommendations laid down in Memo. 62 (Foods), issued by the Ministry of Health. Some day condemnation of meat for tuberculosis might not be so hard on farmers and butchers, when a better system of control of the disease was carried out.

He thought it was too much trouble to use broth each time in testing, but it was useful to the beginner in using the double intradermal test and in doubtful cases at a retest. He had no opinion to express on the supramammary gland. He had often noted that the peritoneum on the left side of a carcass was more commonly affected over all its surface than that on the right, but he had not been able to associate this with the greater number of cases of infection of the left side of the udder or to explain what part the rumen played in the flow of the lymph stream; there was, however, some mystery about the association of infection of the mesenteric glands with the disease in the udder. He agreed with Mr. Canning that infection largely occurred when animals became milk producers. If one tested a lot of young stock, however, a good many reactors would be found, even under two months old, and they should be slaughtered. Good housing was very essential and open-air milk production should be developed, where possible.

The method of separating young stock from infected stock was Bang's recommendation, and from practical experience it could be recommended, because the disposal of reactors was provided for. This was very important, from an economic point of view, if a farmer could have two herds and draft his reactors from the non-reactors to prepare them for disposal in the best possible way. Much could be done meantime, in protecting young stock on the same farm and by the testing of dairy cattle and encouragement of the purchase of tubercle-free cows into non-breeding herds, to reduce the incidence of udder infection. By this means, the isolation of reactors and non-reactors would develop. More stringent methods of control of infection of the milk supply from reactor cows could then be adopted, and that work would reflect credit on the veterinary profession.

## BREED IMPROVEMENT IN RABBITS

The following note has been communicated to a recent issue of the *Journal of the Ministry of Agriculture* by Mr. W. King Wilson, the Rabbit Specialist at the National Institute of Poultry Husbandry, Newport, Salop:—

"Rabbit-breeding is of considerable economic importance, not only because it contributes to the food supply, but on account of the very extensive use made of rabbit pelts in the fur trade. This country imports annually some 50,000,000 rabbit skins for treatment and home consumption or re-export. Large numbers of pelts are also produced here; and among the varieties of tame rabbits are many with skins of appreciable value for fur purposes. The returns of one fur auction firm recorded the recent sale of 163,000 raw skins of four specified breeds, Chinchilla, Havana, Beveren and Angora; the majority of these skins are, perhaps, disposed of by private sale rather than by public auction.

"The Chinchilla was imported from the Continent in 1919, the Beveren during the War, and the Havana at various times, whilst the Angora has long been bred in these islands, but for 'wool' production rather than for skins, although a certain number of Angora pelts find their way to the fur market. During the past dozen years, fur-rabbit breeding has been notable for the production of other and new varieties, several of which, such as the 'Siamese,' 'Marten Sable,' 'Silver Fox,' 'Nutria' and other coloured Rex types, are of considerable economic value. Some of these new types occurred as mutations, but others have been evolved intentionally by applying Mendelian principles to practical rabbit breeding.

"Through careful selective breeding, and the stimulus of strong competition at shows, a phenomenally rapid improvement has been achieved in these new and potentially useful fur breeds. Some idea of the progress made may be realised from the evidence of the show figures. Thus, in 1931, there were over 65,500 entries of live rabbits at 334 leading shows, excluding the purely local exhibitions. At the 1933 Bradford show there were 2,938 entries, including 96 Angoras, 119 Havanas, 197 Sables, 144 Beverens, 215 Chinchillas and 263 Rex. Keen competition at shows of this size is, undoubtedly, one of the most effective stimuli for the improvement of breeds and the quality of their furs."

* * * * *

The liver possess a rhythm of its own; increasing uniformly in weight for six hours after the animal eats, by which time the increase in weight amonnts to 30 to 35 per cent., and then decreasing in weight for the same period of time. —*Vet. Med.*

# Clinical Communications

## RETRACTION OF THE TESTES IN A COLT

P. J. HOWARD, M.R.C.V.S.
Ennis, Co. Clare

In May, 1931, at an inspection of yearling colts, a grey colt was selected as having the possible makings of a future stallion. It was then a well-grown, vigorous youngster, with two well-developed testicles. The colt was well fed and cared for during the following year and came up for inspection again in May, 1932. He had now grown into a promising, nice horse and was approved of by the judges and was quite a stallion. He was examined for soundness by two experienced veterinary surgeons and was found perfect. It was noted that one testicle was smaller than the other.

In due course he was later on—about September—sent by rail about 150 miles to a stud farm, with a view to having him ready for service next season. Some time after his arrival there, it was noticed that his testicles were not showing and he was not exhibiting the usual stallion propensities.

After some weeks no testicle could be seen, or felt by manipulation. The colt was well fed all winter and grew into a fair horse, but showed no stallion characteristics: he was rather dull and quiet. Not being fit for stud, he was returned to the country in April, 1933. He was turned out loose with two mares. With these he would play quietly, sometimes draw his penis and make an attempt, but never serve. All trace of a scrotal sac had now disappeared, and though his head and neck were somewhat stallion-like his behaviour was that of a gelding.

I examined him at the end of May, and though I made a careful search of the scrotal region and then *per rectum*, I could find no trace of a testicle.

It was now decided to operate. The colt was fasted two days and, on June 14th, I operated. He was, as usual, given chloroform standing: he went down happily and was fixed on his back. I removed both testicles, each one held high up in the inguinal canal. The left was like a twin sausage; the right was flattened, and about the size of a large sheep kidney—it was almost impossible to pull out, and it was only with great force and the aid of a torsion forceps that I could draw it out sufficiently to get the écraseur chain on.

The colt made an uninterrupted recovery.

My object in giving this detailed history is to have the fact recorded that such an occurrence can and does happen, and, from a legal aspect, it may be well that this be done.

I have seen the same happen with a bull and have heard of it in a boar. It is likely that other members may have had similar experiences, but so far no such cases have been recorded.

* * * * *

## A NOTE ON THE TREATMENT OF TRYPANOSOMIASIS IN DOGS IN UGANDA

J. CARMICHAEL, M.R.C.V.S.
Veterinary Laboratory, Entebbe, Uganda

Tsetse areas exist in various parts of the country and are a permanent danger to all domestic animals.

Dogs often accompany their masters on shooting expeditions, or tours of duty in fly areas, and are occasionally, either through ignorance or thoughtlessness, exposed to infection. Owing to the better knowledge of the distribution of Glossina, and the education of dog owners, the number of cases has happily decreased in recent years.

There are two trypanosomes which are responsible for the disease in dogs. It is of the utmost importance primarily to determine the species of the infecting organism, as subsequent treatment entirely depends on this diagnosis. Microscopic examination of a stained blood film enables this to be done without much trouble. The outstanding clinical symptoms are, however, discussed below.

*T. BRUCEI.*—This polymorphic trypanosome is transmitted by *Glossina morsitans* and *Glossina palpalis* and is very pathogenic to dogs. Symptoms usually manifest themselves about 14 days after exposure to infected flies and in the early stages consist of fever, lassitude, and slight wasting. These primary symptoms, which are frequently overlooked, are progressive and are followed in three to seven days by the appearance of interstitial keratitis.

This is a leucocytic infiltration of the cornea with subsequent opacity. This symptom is characteristic of *T. brucei* infection, and does not occur in dogs affected with *T. congolense.*

Specific treatment consists of injecting Bayer 205, preferably intravenously, but intraperitoneal injections appear to be nearly as efficacious. The dose depends on the condition of the dog, but in animals where cachexia is not too pronounced a dose of approximately 0·015 grammes per pound body weight is recommended. This should be repeated in three days and again on the tenth day following the first injection.

General treatment should, of course, accompany the specific therapy. Even in advanced cases, where there is marked keratitis and opacity, treatment should be attempted. In

several experimental cases in dogs and also in cats at this laboratory, the eyes cleared up after the disappearance of the parasite from the blood.

In four experimental cases, sub-inoculation into guinea-pigs at varying periods of time after completion of the treatment failed to set up an infection. This indicated that a true sterilisation, as against a premunition, had taken place.

*T. CONGOLENSE.*—In this infection the disease appears to run a course of a more chronic nature. Interstitial keratitis is not a symptom, but there is fever, general lassitude and wasting.

The trypanosome is transmitted by *G. morsitans* and *G. pallipides*. Antimony is the most satisfactory drug in the treatment of this condition, and can be administered by intravenous injection as antimony potassium tartrate or antimosan.

The dose of tartar emetic is from half-a-grain to one-grain-and-a-half, according to the size of the dog. This should be given daily on four consecutive days. A daily blood examination should be made for 14 days following these injections, and if a relapse occurs, the course should be repeated.

In the case of antimosan the dose is approximately 0·25 c.c. for each pound body weight, according to the general condition of the patient, and the injection should be given daily for four successive days. *T. congolense* is more difficult to treat than *T. brucei*, but antimony in adequate doses is usually successful. *T. brucei*, on the other hand, can be readily cured by Bayer 205.

In antimony therapy in dogs it is necessary to watch carefully for any outward symptoms, as individual animals seem to vary considerably in their reaction to this drug and it may be necessary to reduce the dose or suspend treatment for a day or two.

CASES

1.—Sealyham terrier. *T. brucei.* Heavy blood infection with commencing keratitis. Received 0·3 grammes Bayer 205 on April 6th, April 9th and April 16th, 1932. Cured. Reported well March 14th, 1933.

2.—Native dog. *T. brucei.* Advanced case. Received a course of 0·25 grammes Bayer 205 in January, 1932. Blood examined daily until June, 1933. Sub-inoculated into a guinea-pig with negative results. Cured.

3.—Airedale. *T. brucei.* Heavy blood infection and keratitis. Received a course of 0·4 grammes Bayer 205 in December, 1931. Reported well in June, 1932.

4.—Mongrel dog. *T. congolense.* Fever, depression and heavy blood infection. Received two injections of 10 c.c. of antimosan in June, 1932. Reported well March, 1933.

N.B.—Symptoms of jaundice appeared and it was decided not to give the next two injections.

5.—Cat. No. 4. *T. brucei.* Experimental infection. Advanced case with marked keratitis. Received a course of 0·15 grammes Bayer 205 intraperitoneally in November, 1932. Sub-inoculation into mice with negative results. Cured.

6.—Jackal. *T. brucei.* Experimental infection. Advanced case, with marked wasting and keratitis. Given a course of 0·3 grammes of Bayer 205 intraperitoneally in December. Recovered, and at present (March, 1933) healthy.

**Conclusion.**—The object of this note is to indicate that a satisfactory treatment does exist for dogs suffering from "fly" and it is hoped that perhaps treatment will be attempted, rather than the unfortunate animals be destroyed as incurable, which often happens in this part of Africa.

# Abstracts

**[Further Note on Foot-and-Mouth Disease in Southern Rhodesia and an Emergency Method of Inoculation.** Bevan, Ll. E. W. B. *Trans. Roy. Soc. Trop. Med. & Hyg.* xxvii, I, pp. 105-108.]

These pages have already contained reference to the report of the Chief Veterinary Officer, Southern Rhodesia, recording the remarkable achievement of the author (late Director of Veterinary Research) in introducing methods of immunisation against foot-and-mouth disease which resulted in the complete elimination of the menace from that Colony 20 months after its appearance there. With their interest thus stimulated, many readers will turn to this article in eagerness to learn the details of practical and scientific interest concerning one of the most effective pieces of preventive inoculation work standing to the credit of the veterinary profession.

This is a sequel to the first report, embodying the observations of field officers in charge of the work, which were promised in the epitome which appeared in these ***Transactions*** (1932), Vol. xxv, No. 1 (June), p. 89. The special features of the disease as it occurred in Southern Rhodesia, in the laboratory and in the field, are recounted in brief, the principal being that in the majority of cases the infection was extremely mild—"occult" cases characterised by thermal reaction only, with "open" lesions, predominating—and that, under Rhodesian conditions, infection was only transmitted with difficulty, close head-to-head contact being necessary. These exceptional features suggested to the author three methods of dealing with the disease, emergency measures being necessitated by the slow spread of infection under natural conditions, the indefinite nature of the symptoms, the vast and inaccessible areas in which the disease

occurred and the innumerable native-owned cattle to be controlled.

These three methods were as follows: (1) the issue of standardised virus from the laboratory to be used by veterinary officers in the field; (2) the preparation by officers in the field (in accordance with directions detailed in the article) of virus for intra-nasal inoculations—an invariably successful method of infection—and (3) the herding together in kraals for several days of sick and healthy animals to hasten infection.

The experience of field officers in carrying out on the above lines, the foot-and-mouth disease eradication campaign which proved so phenomenally successful, makes impressive reading, as quoted here from the reports of the Chief Veterinary Surgeon which have been reviewed in these columns. Readers may be reminded, however, that during the outbreak, which was eventually stamped out by the establishment of belts of immune cattle between infected and clean areas, some 795,000 animals were involved, of which 185,000 head of cattle were inoculated. Elsewhere in this journal has been reviewed the report of the Chief Veterinary Officer for the Bechuanaland Protectorate, in which he records that this process has since been applied with success to over 300,000 cattle in that territory.

It is of interest to note that when, in January, 1932, the Rhodesia virus was sent to the Weybridge Laboratory to be "typed," a single passage through English cattle was sufficient to deprive it of its local characteristics, for it resulted in a severe reaction with typical lesions, while the resulting infection proved to be readily transmissible from animal to animal.

W. B.

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**[Filtration of the Virus of Borna Disease through Graded Collodion Membranes.** Elford, W. J., and Galloway, I. A. With an Appendix by Barnard, J. E. (1933.) *Brit. J. Exper. Path.*, xiv, 196-206, 1 plate, 6 tables, 14 refs.]

The work here recorded is a further instalment in the important researches undertaken at the National Institute of Medical Research, Hampstead, using the collodion membranes of estimated graded porosity devised by Elford to determine the average diameter of the viruses. Our colleague, Mr. Galloway, who has devoted much attention to the experimental study of Borna disease, has now, in collaboration with Elford, estimated that the diameter of the smallest phase of the virus of this disease, as it is present in brains of infected rabbits, measures 0·085-0·125 $\mu$, *i.e.*, a diameter rather smaller than that of the virus of smallpox or vaccinia, but a good deal larger than that of foot-and-mouth disease. The virus of Borna disease was also found to be a good deal larger than that of louping-ill, from which it could be separated readily by the use of the membranes.

Of particular interest are the micro-photographs, taken under dark ground illumination by ultra-violet light, by Barnard in the plate illustrating the appendix. These photographs depict the small particles which are probably the virus of Borna disease and which suggest a size between 0·11 $\mu$ and 0·14 $\mu$. For comparison, beautiful photographs are given on the plate of *Bacillus prodigiosus*, the virus of canary-pox (presumably a form of fowl-pox), and the vaccinia virus.

J. T. E.

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**[On Naturally-acquired Anti-tetanic Immunity in Bovine, Ovine and Caprine Animals. Its Existence and Mechanism. Comparative Immunological Considerations.** (Trans. title.) Ramon and Lemétayer. (1933.) *Bull. de l'Acad. Vét. de France.* vi, 5, 183-192.]

The writers, after showing the relative rarity of cases in cattle as compared with horses, consider what explanations can be offered to account for this. Sera from cattle were tested for the presence of natural anti-toxin by mixing serum or dilutions of serum with doses of tetanus toxin and injecting into guinea-pigs. By this method it was shown that an anti-toxin exists naturally in the blood of cattle. This anti-toxin was present in much smaller quantities in the few bulls examined when compared with the average titre of cows; this they think may be due to the fact that the bulls examined were mostly kept in, whereas the cows are usually out at grass and so can ingest a larger quantity of tetanus spores.

A hypothesis is suggested to explain the mechanism of the natural production of immunity to tetanus in cattle. The organisms are stated to be commonly present in the alimentary tract of herbivora, and it is suggested that minute quantities of toxin are being formed in the accessory stomachs and so a natural immunity results; in horses and swine, however, the lack of natural immunity is accounted for by the suggestion that the production of the toxin is rendered impossible by the digestive juices which are, of course, absent from the false stomachs of ruminants.

J. S.

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**[Work on the Control of Bovine Tuberculosis (in Switzerland).** Fluckiger, G. *Schweiz. Archiv. f. Tierhlk.* (1933.) Vol. 75, No. 5.]

The author relates the history of control measures for bovine tuberculosis, that have been used in Switzerland since 1899, only seven years after the discovery of tubercle bacilli by Robert Koch. The various cantons decided their own course of action when the first proposals were

brought out; these included compulsory notification of suspected cases of tuberculosis, compulsory livestock insurance, the ordered use of tuberculin for diagnosis and particular ear marking for beasts found infected. Only eight cantons adopted this scheme, which soon came under adverse criticism by livestock owners, who objected to the ear marking and complained about the unreliability of the tuberculin test. The scheme has gone through various stages in later years and in 1926 a special commission was appointed by the Federal Agricultural Department to investigate the position and to make fresh proposals. Finally, in April of 1933, after consultation with all bodies concerned, a new law has been enacted and the following are its main points:—

Art. 1.—The State supports the combat against bovine tuberculosis, which is undertaken by the cantons. Open tuberculosis is alone considered in the plan (open tuberculosis of the udder, genital organs, intestines and lungs).

Art. 2.—The State contributes 50 per cent. of the costs.

Art. 3.—The cantonal work is to be performed in combination with the State stock insurance organisation.

Art. 4.—Further definites the above. Stock owners to contribute one franc per animal per year.

Art. 5.—The cantons are to indicate the institutes at which diagnostic work is to be performed. Animal owners are obliged to notify cases of suspected tuberculosis after the first signs of disease.

Art. 6.—All herds are to be inspected by a veterinary surgeon at least once a year. After one positive finding, the herd is to be periodically inspected until eradication is complete. In dairy herds, in which udder tuberculosis has been found, the control measures must be continued for three years after the last case has been found.

Art. 7.—For the diagnosis of tuberculosis the clinical appearance is preferred and when necessary bacteriological and serological tests are to be used. Tuberculin tests may be applied to suspected cases. Bacteriological and serological tests are to be made in a well-appointed laboratory under the direction of a veterinarian. A number of cantons may jointly make use of the same laboratory.

Art. 8.—Animals with open tuberculosis are to be marked and must not be admitted into other herds.

Art. 9.—Animals removed for slaughter must be marked and the meat inspector must report his findings to the prescribed official quarter.

Art. 10.—Condemned animals must be slaughtered within 30 days of official diagnosis. The authority may in certain cases extend this period.

Art. 11.—Tuberculous milk, etc., may only be used for animal food after being boiled. Cattle owners must have their premises thoroughly cleaned and disinfected under veterinary supervision at least once a year. The standings of animals found affected must be cleaned and disinfected.

Art. 12.—In particular cases compensation will only be paid if all conditions of the above law have been performed.

Arts. 13, 14, 15 and 16.—These concern the arrangements for the various authorities concerned in the scheme.

This scheme is not compulsory for every cattle owner, but is voluntary, the expert commission deciding in that sense having regard to the diversity of agricultural conditions in the country.

The compulsory connection of the scheme with stock insurance is a great help to its practicability. The veterinary supervision of farms (Art. 6) will, in addition to tuberculosis, have a favourable influence on the control of other diseases, such as Johne's disease and mastitis, and the documentary records, including reports from meat inspectors about condemned animals, will also be very valuable for future efficiency.

Various other points in the law are also discussed by the author. The mere secondary value of tuberculin tests is of significance.

Finally, the author calculates the probable cost of the work: on a basis of nearly 200,000 tuberculous cattle (out of some 1,250,000 cattle in the country), of which 3 per cent. may be taken as affected with open tuberculosis, the probable annual cost—for compensation and working expenses—is about 2,000,000 francs.

J. E.

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**[The Campaign against Warble Fly.** (Edit.) *Rev. Gen. Méd. Vét.*, vol. xlii, No. 497]

For years ecto- and endo-parasites of the domesticated animals have received the attention of research workers, but only fairly recently have efforts been directed against the warble fly, the larvæ of which cause so much damage. Reference is made to the ravages of this fly in the various countries. Unsuccessful efforts have been made to destroy the larvæ when they hatched from the egg and before they penetrated the skin. Dressings to repel the female fly have been useless and now attention is being paid to the destruction of the larvæ under the skin. Manual extraction of the larvæ has been used and also dressings, which appear to vary in different countries. Bases consisting of nicotine, turpentine, paradichlorobenzene and derris root are in common use. Injections of iodine or arsenic have been recommended, but this is not always practicable where an animal is heavily infected and abscesses may supervene.

(*Concluded at foot of Column* 1, *p.* 890.)

# Reports

## CITY OF LONDON

### Meat and Food Inspection Report

The report of the Medical Officer of Health for London, for the year 1932, has just been issued. Embodied in this is the report on meat and food inspection of the Veterinary Officer, Lieut.-Colonel T. Dunlop Young, O.B.E., F.R.C.V.S., D.V.S.M., F.R.SAN.I.

From this report it is seen that Colonel Young is assisted in his work by 13 meat inspectors. The report in connection with the meat and fish supplies of London is a comprehensive one.

At the beginning of the report is given the amount, in hundredweights, of beef, mutton and lamb, pork and bacon, imported into London, both foreign and Empire, in 1932 as compared with 1931. There are decreases in the totals of 1932 as compared with 1931, as follows:—

Beef: decrease of over 31,000 tons.
Mutton and lamb: decrease of over 8,000 tons.
Fresh pork: decrease of over 6,000 tons.
Bacon: slightly up.

The livestock imported in 1932 came principally from the Irish Free State and Canada.

| | |
|---|---|
| Cattle ... ... ... | 625,906 |
| Sheep ... ... ... | 440,871 |
| Pigs ... ... ... ... | 302,760 |

There is a drop in the Canadian cattle imported, from 26,991 in 1931 to 16,724 in 1932. It would be interesting to know the cause of this reduction in numbers of Canadian cattle received.

The figures showing the export of home-grown foodstuff are extraordinarily small as compared with the export of imported food, as follows:—

*Exports of Home-Grown Foodstuffs.*

| | |
|---|---|
| Fresh meat ... ... | 6,987 tons |
| Bacon and hams ... | 2,368 ,, |
| Offal ... ... ... | 2,293 ,, |

*Exports of Imported Food.*

| | |
|---|---|
| Fresh beef ... ... | 8 cwts. |
| Chilled beef ... ... | 724 tons |
| Frozen beef ... ... | 7,347 ,, |
| Mutton and lamb ... | 1,527 ,, |
| Bacon ... ... ... | 10,082 ,, |
| Hams ... ... ... | 613 ,, |
| Pork (frozen) ... ... | 69 ,, |

At the London central markets, the supplies of meat, etc., over the twelve months show a total of 462,246 tons, from all sources, of beef, mutton and lamb, pork, bacon, etc., as well as poultry, game and rabbits.

In view of the supposed improvement of meat inspection throughout the country and the alleged increasing condemnation of unfit foodstuffs at the places of origin, it is significant to read, in this report by Colonel Young, the following: "The following table of diseased meat seized or surrendered in the markets shows no improvement in inspection at the places of slaughter, but rather a relaxation. This confirms remarks made in the previous reports and emphasised in the report of the Slaughtering of Livestock Committee of the Economic Advisory Council, which states: 'Meat inspection in private slaughterhouses in England and Wales is admittedly unsatisfactory. There is no uniformity in the standards of inspection or the rigour with which they are applied.' Meat traders in general reply: 'This is the fault of local authorities and cannot be laid at our doors, because we have for years pleaded for rigid inspection by properly qualified persons.' "

In the table showing the cause of condemnation among carcasses from Great Britain, there are only 17 beef carcasses condemned, nine of which were cut down for tuberculosis and five for emaciation. Of the mutton carcasses the greatest quantity was cut down for distomatosis, namely, 169 out of a total of 347; 86 were condemned for emaciation and 41 for peritonitis and pleurisy. Of the 1,500 pig carcasses condemned, tuberculosis accounted for 728, peritonitis and pleurisy for 419 and emaciation for 120. These figures strongly bear out the remarks of Colonel Young, that there is laxity of inspection in various parts of the country, which allows 211 carcasses of beef, mutton and pork to be sent to London affected with emaciation and hydræmia, the huge number of 460 carcasses of mutton and pork affected with peritonitis and pleurisy and 728 pig carcasses affected with tuberculosis.

In the consignments received from Southern Ireland, it is shown that 19 beef carcasses were condemned for tuberculosis and 17 for pleurisy and peritonitis, and that 112 sides of pork were condemned for tuberculosis.

The paragraph showing the number of cases of caseous lymphadenitis met with amongst imported mutton is rather interesting. Years ago Colonel Young was conspicuous in calling attention to the presence of this disease amongst imported mutton carcasses received at the London markets, and as a result of the publicity given to his remarks at that time, a great deal of the attention of those connected with the trade, not only of this country but of the countries of origin of the mutton, was drawn to the

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In Denmark dressings were made compulsory and the incidence of warbled hides reduced from 30 per cent. to 4 per cent. The biggest difficulty in the campaign consists of instilling the stock-breeder with a desire to get rid of warble fly, which he too often considers as harmless. For success the method of destruction must be simple and the expense involved negligible.

D. W. M.

presence of this disease in the carcasses, and the figures at the present day bear out the good results of that publicity. The following table from the report shows the reduction of caseous lymphadenitis in 1932 as compared with the previous two years:—

| *Countries.* | *Carcasses.* | | |
|---|---|---|---|
| | 1930 | 1931 | 1932 |
| Argentina ... | 918 | 371 | 483 |
| Australia ... | 222 | 241 | 187 |
| Brazil ... ... | 26 | 30 | — |
| Chile ... ... | 160 | 147 | 105 |
| New Zealand ... | 311 | 201 | 246 |
| South Africa ... | 43 | — | — |
| Uruguay ... | 152 | 40 | 3 |
| Totals ... | 1,832 | 1,030 | 1,024 |

The summary of the unsound food destroyed at the London markets is somewhat alarming, the total at the central markets, cold stores, Leadenhall Market and city shops during the year being 928 tons, an increase of 165 tons over the year 1931.

During the year there were three persons prosecuted for consigning diseased meat to the markets, and fined £20, £10 and £25 in these cases.

It is interesting to note that Colonel Young was permitted by the Corporation to visit the Buenos Aires Cold Storage Congress in August and see the system of meat inspection in Uruguay and Brazil. At these places Colonel Young was in the unique position of having an inside knowledge of how the meat is produced, slaughtered and inspected in the various countries which export meat to the London markets.

The report is concluded with remarks on the meat inspection of slaughterhouses, in which there is a résumé given of the powers of the meat inspectors in London.

It is stated in the report that the evidence obtained as a result of investigation in the seizures in Smithfield Market may show either: "(1) that the local authority has provided insufficient inspection; or (2) as it more often happens, that evasion has been attempted."

It is further stated in the report that the present regulations have improved meat inspection but that there is a paucity of competent meat inspectors, also a disinclination of local authorities to increase the burden of local taxation by the appointment of additional inspectors, as will be necessary to ensure that every carcass slaughtered in their area is seen before being despatched to the market.

It is further recommended that: "The obvious and complete solution of the whole question seems to be in the provision of centralised lairages and abattoirs, where sufficient inspection would be a much more simple matter. The closing of scattered slaughterhouses would then not be the impossible task that it is at present. Advocacy of this, however, the City Corporation quite recognises, is untimely at the present moment, but when, at some future date, circumstances permit, appropriate steps will doubtless be taken to further the improvement of meat inspection this indicates."

It appears that there is an improvement in the wrapping of meat and other foodstuffs in the shops and storage places in the area under Colonel Young's administration.

Such a report as this is a very valuable guide as to the class of meat and foodstuffs handled in London and, further, the conclusion of the remarks of the report should prove very helpful to outside areas in the provinces.

B. D.

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## CITY OF MANCHESTER

### Report of Markets Committee, 1932-33

The annual report of the General Superintendent (Mr. A. Chadwick) for the year ended March 31st, 1933, includes a report of the work carried out by the Food Inspection Staff, under the supervision of the Chief Veterinary Inspector, Mr. A. D. Minor, M.R.C.V.S.

Mr. Chadwick is to be congratulated on the concise manner in which a mass of statistical matter and other information of such a large undertaking has been shown.

The annual receipts and payments for the year 1932-33 show that receipts amounted to £162,901 5s. 4d., with £142,281 9s. 1d. in payments (inclusive of interest, sinking fund, etc., charges), leaving a balance of net receipts of £20,619 16s. 3d. This is very satisfactory considering that the salaries of the staff of 174 members are included in the payments from the revenue account, excepting a proportion of the inspectors' salaries being refunded from the general rate fund (diseases of animals account).

The Department is divided into various branches and it is noted that Mr. Minor, the Chief Veterinary Inspector under the Diseases of Animals Acts, is also manager of the city abattoirs and wholesale meat market.

The work of this section shows that there were 550,222 animals slaughtered at the city abattoirs, 3,127 animals at the Rusholme abattoirs, and 29,143 animals at 23 private slaughterhouses, making a total of 582,492 animals slaughtered in the city during the year, as compared with 515,105 in the previous year.

There was a decline in the number of cattle and pigs slaughtered as compared with the preceding year and there has been an increase in the number of carcasses of imported mutton exposed for sale in the wholesale meat markets.

This has been the experience in other abattoirs during the past year and points to the taste of the public for small joints and also the low prices of mutton in this period.

The receipts from the city abattoirs and wholesale meat markets and certain adjacent properties were £34,357, being the highest yet recorded, and it is also shown that of the total number of animals slaughtered within the city, about 95 per cent. were killed within the municipal abattoirs, a position in regard to slaughter of animals for food of which Manchester can be justly proud.

The amount of unwholesome food condemned amounted to 458 tons of meat, 102½ tons of fish, 307 tons of vegetables, 24½ tons of fruit, in addition to various quantities of miscellaneous foods.

The electrical apparatus for use in the stunning of pigs at the city abattoirs was adopted during the year.

The Superintendent reports that the anticipations of the Markets Committee in connection with the establishment of a cattle market at Mode Wheel have been more than realised. The market was opened on May 1st, 1931, and during the year under review 358,489 home-produced animals and 29,927 imported animals were exposed for sale therein. This shows evidence of successful enterprise on the part of the Markets Committee.

Under the heading "Disease of Animals," the number of outbreaks of scheduled diseases and the work carried out by the inspectors in connection with the provisions of the Diseases of Animals Acts and Orders of the Ministry of Agriculture are shown.

The cold storage and other markets are also dealt with in other sections of the report. Mention is made of the approval of Revised Market Bye-laws with regard to the licensing of porters in the markets.

The question of the establishment of miscellaneous markets of various descriptions throughout the city is under consideration and this, together with the part the General Superintendent has taken in matters associated with marketing under the Agricultural Marketing Act, 1931, and the fact that the contribution of the Markets Committee this year towards the relief of the city rate brings the total amount allocated from the markets for this purpose to the sum of one million pounds, is a credit to Mr. Chadwick's business and organising abilities.

The retirement of Mr. A. D. Minor is noted and also that certain rearrangements of the staff were agreed upon, but these are not given in the report and it is hoped that the satisfactory control of the inspection of animals and other foods at present in operation will be continued.

W. T.

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It is announced that henceforward all pigs passing through the public abattoirs of Birmingham—numbering approximately 88,000 a year—will be slaughtered by means of the "electrolethaler."

# N.V.M.A. Divisional Report

## NORTH MIDLAND V.M.A.*

### MEETING AT SHEFFIELD

A meeting of the above Association was held at the King's Head Hotel, Change Alley, Sheffield, on June 20th, 1933.

The President, Mr. F. C. Scott, occupied the chair, and there were also present: Messrs. Abson, Bowett, Canning, Collinson, Fletcher, Hudson, Tullis, Walker, and W. Tweed (Hon. Secretary). Messrs. J. R. Hudson and W. A. Mulligan were present as visitors.

Apologies for non-attendance were received from Messrs. Green, Marrison, and Robinson.

Arising out of the correspondence, a letter from the N.V.M.A., on the subject of distemper immunisation, was read and discussed.

The Hon. Secretary gave a report of the Milk Reorganisation Commission's recommendations. The relevant sections from the Report were read to the meeting. He said that he considered the Profession should welcome any new additional work which was likely to develop, and that we owed these developments in dairy herd inspection in a great measure to the pioneer work of some of our whole-time men. It appeared regrettable that some members of the Profession should be narrow-minded enough to allow jealousy to impair their friendship for whole-time men, for, when all was said and done, local authorities would please themselves whom they appointed to carry out work which, they were all agreed, was necessary, and in many places was not carried out at all.

Attention might profitably be directed to the scientific aspect of tuberculosis eradication, leaving the appointments open to local authorities, who were made legally and financially responsible for the institution of routine inspection of dairy cattle. If they considered that veterinary surgeons could act for a public authority and the owner, then all veterinary practitioners should be asked to act as part-time inspectors; but it was to be hoped that at least one whole-time veterinary officer would be appointed, as much work was carried out to-day by other than veterinary surgeons which rightly belonged to them. It behoved them to watch new developments in the wider sense for the good of all, and that could not be done unless contact with the proper authority were obtained, for which a whole-time man was necessary.

Mr. Scott asked how small County Boroughs would work with a whole-time official, and the Hon. Secretary replied that that could be well arranged by amalgamating with County Councils for all the work to come under the supervision of their Chief Veterinary Officer. This would

* Received from publication, July 28th.

not necessarily mean displacing the part-time inspector who was doing the work to-day, but if other veterinary duties were carried out in the county boroughs it might not be practicable to do this.

After a discussion, in which all the members took part, it was resolved to send the following replies to the *questionnaire* from the N.V.M.A.:—

1. That the veterinary inspection be a routine clinical inspection of all herds.

2. By a whole-time veterinary officer appointed by the Administrative Authority or combination of Authorities, assisted by general practitioners.

3. That the number of examinations of herds will depend on local requirements, the ideal being at least four times per annum, but such administrative details should form part of the responsibilities of the Chief Veterinary Officer.

### Interesting Cases

Mr. R. Hudson exhibited a specimen of a horse's spermatic cord and testicle, which had become adherent to the bladder. He said this horse passed urine irregularly, and he cast and chloroformed him for castration. He found it was very difficult to dissect the connective tissue round the tunica vaginalis, and when he got to the second testicle he discovered that it was adherent to the bladder, and that pus was present. The bladder had become displaced and was resting on the inguinal canal. The operation had been successful.

Mr. Fletcher reported a case, uncommon in his experience, of a cow with temperature of 106·5° and copious discharge from the nostrils. Later he noted a deposit in the nostrils which made breathing difficult, and she was slaughtered. On *post-mortem* the deposit extended to the trachea, and it had been suggested that this was a case of malignant catarrh.

Mr. Tullis asked if the horns were loose, as in the cases of malignant catarrh he had seen this was common. The treatment given in these cases with marked success was half-a-pound of yeast.

Mr. Hudson said the condition was common in that district 20 years ago. It was often associated with "blain" or urticaria, and sometimes transit fever. He did not think it was true malignant catarrh; the deposit was probably a coagulation of mucus.

Mr. Scott reported a case in a nine-month old puppy which he had been asked to see six months previously, and upon which he had expressed the opinion that it might have tumour formation to account for the chronic brochitis. A week ago, the puppy was destroyed, and tumours the size of small berries were present in the bronchial tubes.

Mr. Collinson recounted four cases of cows giving blood in their milk. He had treated with 10 c.c. of collosal manganese, and the milk cleared up in 24 hours. He also reported good recoveries obtained in cases of mastitis by the injection of 40 c.c of parenchymatol silver albumin supplied by Kommer and Co., into each affected quarter, using a 3-in. needle.

Mr. Scott observed that he had had good results with the injection, in parturient derangement in the mare, of 30 c.c. of a 1-10 solution of this preparation.

Mr. Bowett said he had used collosal manganese in mastitis and white scour cases, with very little result.

*Paper.*—The President then called on Mr. W. Tweed to give his paper on "Tuberculosis in Bovines." [This paper, and a report of the ensuing discussion, are reproduced elsewhere in this issue.—Ed., *V.R.*]

The proceedings terminated with the passing of a hearty vote of thanks to Mr. Tweed for his paper.

W. Tweed, *Hon. Secretary.*

# Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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## DIARY OF EVENTS

Sept. 11th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4.30 p.m.

Sept. 15th.—Meeting of the Southern Counties Division, N.V.M.A., at Bournemouth.

**Sept. 18th-22nd.—N.V.M.A. Congress, Llandudno.**

Sept. 21st.—Meeting and Luncheon of the Royal (Dick) Veterinary College Alumnus Association, at the Royal Hotel, Llandudno.

**Sept. 25th-26th.—R.C.V.S. Jubilee Memorial** and Bursary Prize Examination.

Oct. 4th.—R.C.V.S. Committee Meetings.

Oct. 5th.—R.C.V.S. Registration Committee.

Oct. 6th.—R.C.V.S. Committee and Council Meetings.

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### SLAUGHTER OF ANIMALS ACT, 1933

#### Stunning Before Slaughter

Under the Slaughter of Animals Act, 1933, which will come into operation on January 1st, animals in slaughter-houses and knackers' yards must be stunned before slaughter.

In a circular to local authorities, the Minister of Health points out that the Act requires that the stunning shall be by a mechanically operated instrument, which is defined to include an electrical instrument. This requirement, however, will not apply to sheep unless the local authority apply it by resolution, while goats can be excluded by resolution.

The requirement applies to pigs; but if electrical energy is not available, this is a defence to proceedings unless the prosecution show that it could reasonably be made available. Slaughter

by a Jew or a Mohamedan for his co-religionists is exempt from this section; but, as regards the former, only if he is licensed by a Commission which is to be established under the Act.

The Act places on local authorities the new duty of licensing slaughtermen. A licence, once granted, is available throughout England and Wales, but must be produced on demand to the local authority in whose district the licensee is working. An appeal to Petty Sessions lies against the refusal of the grant or renewal, or the suspension or revocation, of a licence.

Other provisions are that local authorities which have established slaughter-houses are empowered to employ persons to slaughter or stun animals, and to make reasonable charges for the services of those persons.

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## MAJOR-GENERAL GEORGE FLEMING

The announcement is made that Brigadier George Fleming, C.B.E., D.S.O., who is the son of the renowned member of our profession of that name, is promoted to Major-General. He is commanding the Shanghai Area, and will vacate this post on promotion later in the year, when Colonel F. S. Thackeray, D.S.O., M.C., arrives in relief.

Major-General Fleming is 54, and was commissioned into The Somerset Light Infantry from the ranks of the Imperial Yeomanry during the South African War. The battalions which came under his command were Service units of The Gloucestershire Regiment and the North Staffordshire Regiment, the 9th Battalion, The Royal Warwickshire Regiment, and the 1st Battalion, The Welch Regiment. He was adjutant of the 3rd Battalion, The S.L.I., staff captain with Force "D," and was mentioned, promoted and decorated for regimental service in France, Belgium, Gallipoli, the Balkans, Turkey, Mesopotamia, Persia, and Trans-Caspia.

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## ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army

September 1st.—The following to be Lts. (on prob.) (September 2nd):— J. McL. Ross, M. M. Healy.

### Territorial Army

Captain H. B. Allan resigns his commission (August 5th).

### Territorial Decoration

The King has been graciously pleased, under the terms of the Royal Warrant dated October 13th, 1920, to confer the Territorial Decoration upon Major T. S. Green.

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## OBITUARY

Hickey, Sidney George M., Lucknow, India. Graduated London, December 22nd, 1910; died August 1st, 1933.

Captain Hickey, whose death occurred from heart failure, and who was the elder son of Captain and Mrs. D. Hickey, late of Windsor, was Veterinary Director to the Government of the United Provinces.

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### Death of a London Student

It is with much regret that we record the death, on August 23rd, of a promising student at the Royal Veterinary College, London, in Harold Eric Salisbury Churchill, who, after a short illness, passed away during the long vacation at the age of 22 years. Mr. Churchill entered the Royal Veterinary College in May, 1932, thereby being one of the last to enter under the old four-year course.

A College friend of Harold Churchill writes: "He was educated at Harrow, and it was on the advice of Dr. Norwood that he turned his mind to veterinary science, for which, so far as could be judged, he had a special aptitude, especially for research. He had already gained a certain amount of practical experience, since he had for some time worked on a cattle farm in order to gain first-hand knowledge of animals and their special requirements.

"Up to the end of last term he was in the best of health, and his early death has come as a great shock to us all. Of an engaging disposition, to those who knew him he was a loyal and true friend, and his loss leaves a gap, not only in the ranks of veterinary aspirants, but in the hearts and minds of his friends."

Sincere sympathy will be extended to his father and mother, Mr. and Mrs. Salisbury Churchill, as well as the other members of his family. He was buried in the family vault at Brookwood Cemetery, after a funeral service, at which there was a large and deeply sympathetic attendance, at Holy Trinity Church, Cambridge, on August 26th.

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## LEVERHULME RESEARCH FELLOWSHIPS

Amongst the 17 Fellows selected from the applicants for Research Fellowships under the above scheme are F. Fraser Darling, Ph.D., Chief Officer, Imperial Bureau of Animal Genetics, Edinburgh, and C. S. Elton, M.A., Director of the Bureau of Animal Population in the University of Oxford and University Demonstrator in Zoology. The subject of research by the former will be "An ecological study of a herd of Scottish red deer, with special reference to behaviour," and that of the latter "Fluctuations in numbers of wild mammal populations."

# Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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## (1) BLOODLESS CASTRATION; (2) VETERINARY ADVISORY SCHEME

### To the Editor of the Veterinary Record.

Sir,—I was very interested to read the remarks made by Mr. Llewelyn-Jones *re* (1) bloodless castration; and (2) veterinary advisers. In regard to the first, I would like to endorse all Mr. Jones said about the "Lewis Cord Holder." In my opinion, this holder is indispensable, and is far superior to the ordinary holder, as it absolutely assures the complete crushing of the cord, on which depends the success of the operation.

I think it advisable to send the "Burdizzo" to the makers for overhaul at regular periods. If this is done, and a holder used, I do not think a single "miss" will take place.

The question of Veterinary Advisers is a very serious one for practitioners to contend with, and undoubtedly the scheme as it stands is entirely wrong.

Many practitioners I know have suffered heavy financial losses because of this scheme, and great loss of prestige. The scheme is yet in its infancy, and unless something is done, there is no telling what the end of it may be. As Mr. Jones remarks, it is high time we united together and attempted to get something done or we shall cease to exist—appointments getting smaller, coal mines, etc., closed down, and agriculture in such a deplorable state. The practitioner, who has less voice than any one in the profession, undoubtedly works the hardest for the least remuneration; in fact, in many cases in these days it is a "labour of love"—and yet someone is for ever stepping in and taking the "plums."

The practitioner is not recognised as he ought to be by any of the councillors or local authorities. To my knowledge, some councillors in an adjoining county seem to think whole-time men—some of whom have not had a quarter of our practical experience in the examination of dairy cows, or any other branch of the profession—are more capable of administering the various orders than we are.

This state of things is largely due to practitioners pulling different ways. Every practitioner should be a member of the N.V.M.A. It is surprising to see so few names in the Register of Members of the Association. If one stops to think, it is quite easy to understand why we are always the under dogs and simply allow ourselves—without any kind of protest—gradually to fade away.

I am, Yours faithfully,

T. W. Hughes.

Grosvenor Lodge.
Mold, N. Wales.
*September 2nd*, 1933.

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## POLLUTION OF DRINKING FOUNTAINS

To the Editor of the Veterinary Record.

Sir,—The summons which was heard recently at Bow Street Police Court against a lady who was charged with polluting a drinking fountain by permitting her dog to drink from a metal cup, appears to have aroused a very considerable amount of interest in the public mind.

As the veterinary surgeon who gave evidence, I continue to meet people who wish to air their views on the subject, and I find that the majority commend the magistrate's dismissal of the summons. At the same time, it is obvious that a good deal of misconception exists as to the true position of affairs, and for my own protection it seems quite necessary that I should state that I appeared as a witness for the prosecution.

Counsel for the prosecution put a straightforward question "Would a dog, drinking from a cup, pollute either the water or the cup so as to render one or the other unfit for human use?" My reply was a statement of mere fact when I said that it was highly improbable.

Unfortunately I was not asked by anybody to amplify my answer or give any reasons therefor, and the magistrate proceeded to give his verdict. There were, however, three very substantial reasons for this opinion, one of which was that when a dog drinks, it does so from the surface of the water, and has not to grasp the edges of the cup with its lips as does a human being; consequently there is no contamination of the cup.

Secondly, the diseases which could be transferred from the mouth of a dog to a human are so few and rare that they are negligible. Of these, rabies, parasitic worm, and maybe pyorrhœa are almost the only examples. But rabies is extinct in this country, and parasitic worm infection may almost be ruled out by reason of its rare incidence.

On the other hand, one can easily recall a number of diseases which could be, and frequently are, transmitted from one human being to another through the agency of common drinking vessels; such, for instance, as tuberculosis, syphilis, diphtheria, influenza, typhoid, and pyorrhœa, among others.

Finally, it is inconceivable that anybody, contemplating drinking from a public cup, would fail to throw away that water which remained in it, and swill it out with fresh water. Thus, I say that a dog would pollute neither cup nor fountain to the same extent that either or both might be contaminated by man.

Undoubtedly, no person with refinement or delicate taste would consent readily to drink out of the same cup with an animal; but then, neither would he share a common mug with a human unless he first washed the mug.

From an æsthetic point of view, therefore, some people might justly shudder at the mere idea, but that shudder would be based upon fancy and not upon fact. I can imagine the kindly consideration and humanitarian sympathy which prompted the defendant lady to give her dog a drink on so intensely hot a day. She could not bear, as I could not, to drag the parched dog away from the water upon which it gazed so longingly; and as there were no facilities for animals, what other course could she take?

Many letters have been addressed to the newspapers (no less than to me) and some leading articles also have appeared reviewing the matter from all angles; but the most valuable result of the controversy is that the Metropolitan Drinking Fountains Association is now considering the installation of a system of bubble-fountains both for man and animals, in which the use of a cup is abolished.

Yours faithfully,

Hamilton Kirk.

"Croyland,"
938, Finchley Road, Golders Green, N.W.11.
*September 2nd*, 1933.

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## N.V.M.A. CONGRESS, 1934

To the Editor of the Veterinary Record.

Sir,—I was absolutely horrified at Mr. J. W. Conchie's letter in your issue of July 1st, suggesting that the National Congress should be held in the form of a cruise next year. I am quite certain if this were done that many would stay away for obvious reasons.

Yours faithfully,

Graham Rees Mogg.

Red Down Camp,
Tilshead, Wilts.
*September 5th*, 1933.

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*The Editor acknowledges, with thanks, the receipt of the following:—*

Communications from Mr. H. E. Bywater (West Ham), Captain F. C. Heathcote (Bridgnorth), Major-General Sir John Moore (London), Mr. H. M. Salusbury (Tanganyika), Major H. G. Simpson (Amersham), Mr. A. R. Smythe (Falmouth), and Mr. H. C. Swann (King's Lynn).

Report of a meeting of the North of Scotland Division, N.V.M.A., from Mr. George Howie (Hon. Secretary).